

Baker

5/13/93-03651

Baker Environmental, Inc.
Airport Office Park, Building 3
420 Rouser Road
Coraopolis, Pennsylvania 15108

(412) 269-6000
FAX (412) 269-2002

May 13, 1993

Commander
Atlantic Division
Naval Facilities Engineering Command
Building N-26, Naval Station
Norfolk, Virginia 23511-6287

Attn: Ms. Linda Berry, P.E.
Code 1823

Re: Contract N62470-89-D-4814
Navy CLEAN, District III
CTO-0133, RI/FS at Sites 6, 9, and 82
Phase I and II Groundwater Investigations
Summary and Recommendations

Dear Ms. Berry:

Baker Environmental, Inc. (Baker) has received all of the preliminary data (i.e., the data have not been validated) associated with the Phase II Groundwater Investigation at Sites 6 and 82. Recommendations for implementing additional investigations are presented in this correspondence. For purposes of concluding the RI/FS, no investigations are required; however, additional groundwater studies to determine placement of containment/extraction wells should be conducted as part of a pre-design study.

BACKGROUND

The Phase II Groundwater Investigation resulted in the construction of seven deep monitoring wells [depths ranged from approximately 94 feet to 230 feet below ground surface (bgs)] and four shallow monitoring wells (approximately 25 feet bgs). The purpose of the Phase II investigation was to evaluate the vertical and horizontal extent of groundwater contamination detected at Sites 6 and 82. The initial groundwater investigation (Phase I) in this area determined that shallow groundwater is contaminated with volatile organic compounds (VOCs), which have migrated into the deeper portions of the Castle Hayne aquifer. The highest levels of contamination were detected in deep monitoring wells that are located at Site 82.

PHASE II GROUNDWATER INVESTIGATION

The Phase II investigation initially involved a soil gas survey at Site 82 to provide additional information for determining shallow groundwater well locations and potential source areas. Based on the results of the soil gas survey, three shallow wells (6GW32, 6GW33, and 6GW34) were installed at Site 82 east of the ravine and west of Piney Green Road. Additionally, three temporary wells (T-1, T-2, and T-3) were installed at Site 82 in the marsh area, just south of Wallace Creek.

Ms. Linda Berry
May 13, 1993
Page 2

Preliminary groundwater analyses (see Table 1) indicate that the horizontal extent of the shallow groundwater plume is defined. The shallow groundwater plume is primarily comprised of the VOCs: tetrachloroethene (PCE), trichloroethene (TCE), and 1,2-dichloroethene (1,2-DCE). The VOC plume appears to originate in the eastern portion of Site 82 and extends in a northwest direction where it discharges into Wallace Creek. Phase I and II shallow well locations are shown on the attached Figure 1.

Seven deep monitoring wells (67GW1DA, 6MW3D, 6GW15D, 6GW35D, 6GW30D, 6GW36D, and 6GW37D) were installed during the Phase II groundwater investigation to determine the vertical and horizontal extent of groundwater contamination detected during the initial investigation. The deep monitoring wells were installed to track groundwater contamination that was primarily detected between Lot 203 and Wallace Creek, east of the ravine. The Phase II deep well locations are shown on the attached Figure 2.

Onsite groundwater contamination at Site 82 was detected at elevated levels (greater than 1 part per million) in deep wells 6GW1D, 6GW27D, and 6GW28D during the Phase I investigation (see Table 2). These wells monitor groundwater quality in the upper portion of the Castle Hayne aquifer at a depth of approximately 100 to 110 feet bgs. The vertical extent of this contamination was investigated during Phase II by installing monitoring well 6GW1DA. Well 6GW1DA was installed to a depth of approximately 230 feet bgs, just above a clay layer (refer to Figure 3). Groundwater samples collected from this well exhibited VOCs ranging in concentration from approximately 122 µg/l to 263 µg/l (note that two samples were collected from this well - see Table 2).

Preliminary results of the Phase II deep groundwater investigation (see Table 2) indicate that the VOC contaminants in the deep groundwater have migrated offsite. Groundwater flow direction is predominantly west-northwest. The highest VOC levels in offsite monitoring wells were detected in well 6GW37D (180 µg/l total VOC), which is located west of Site 82 between the railroad tracks and Holcomb Boulevard (see attached Figure 2).

Deep monitoring wells 6GW3D and 6GW15D were installed east and south of Site 82, respectively, to evaluate upgradient groundwater quality. Both of these wells exhibited moderate levels of VOC contamination (i.e., greater than drinking water standards but at much lower levels than onsite wells). Contamination in these upgradient wells may have resulted from the long-term pumping of supply well HP-651 (currently not in service). This long-term pumping may have influenced the direction of the contaminant plume.

VOC contamination north of Site 82 across Wallace Creek was detected in wells 6GW36D (9.8 µg/l) and well 6GW35D (3.0 µg/l). Well 6GW35D is located approximately 500 feet southeast of supply well 633, which is operating. Both of these wells were installed to evaluate offsite groundwater quality downgradient of Site 82. Well 6GW30D, which is also located north of Site 82 adjacent to Piney Green Road, did not exhibit VOC contamination.

In summary, widespread groundwater contamination has been detected at Site 82 in both the shallow and deep monitoring wells. Groundwater samples collected from deep monitoring wells exhibited significantly higher VOC levels than shallow monitoring wells.

Ms. Linda Berry
May 13, 1993
Page 3

The horizontal extent of shallow groundwater contamination has been defined. The source of contamination is from contaminated soil in the eastern portion of Site 82 and possibly from buried drums in the southeastern portion of Site 82. The highest VOC levels in shallow groundwater were detected in wells 6GW32 and 6GW34, which are located in the eastern portion of the site.

Deep groundwater contamination is significant onsite with VOC levels ranging from 4,100 to 64,278 $\mu\text{g/l}$. Offsite deep groundwater quality indicated the presence of TCE, PCE, and 1,2-DCE above drinking water standards in some of the offsite monitoring wells. However, the level of contamination in offsite wells, when compared to onsite wells, is substantially lower indicating that the offsite wells are located near the outer boundary of the plume.

RECOMMENDATIONS

Sufficient information is currently available to conduct a baseline human health and environmental risk assessment, estimate the nature and extent of groundwater contamination, and evaluate remedial alternatives for the remediation of shallow and deep groundwater. However, additional deep monitoring wells are necessary west of Site 82 (across Holcomb Boulevard) to aid in the determination of containment well placement. Containment of the deep groundwater plume is one of the alternatives identified for this site. Further investigations involving the tracking of this plume can be conducted as part of a pre-design investigation rather than extending the RI into a third phase. By performing this investigation under a "pre-design" study, a record of decision (ROD) can be determined without waiting for the completion of additional studies related to the design of the remedial alternative.

The additional pre-design studies will involve: (1) the collection of a second round of groundwater samples (VOC analysis only) from deep wells 6MW3D, 6GW36D, 6GW30D, 6GW35D, 6GW37D, and 6GW15D, which were installed as part of the Phase II groundwater investigation; and (2) the installation of at least two deep monitoring wells west of Holcomb Boulevard to identify the boundary of the VOC plume. Based on the levels of VOC contaminants detected in wells 6GW37D (180 $\mu\text{g/l}$) and 6GW35D (3 $\mu\text{g/l}$), the outer boundary of the VOC plume is anticipated to be just west of Holcomb Boulevard. Groundwater flow is west-northwest from the Site 82 area toward Wallace Creek and the New River.

One deep-monitoring well [proposed deep well 6GW38D (approximately 110 feet deep)] is proposed south of Wallace Creek (and west of Holcomb Boulevard) and the other well [proposed deep well 6GW39D (approximately 110 feet deep)] north of Wallace Creek (and west of Holcomb Boulevard) as shown on Figure 2. The location of proposed monitoring well 6GW39D will be dependent on the results of a sample collected from supply well HP-633, which is located along Holcomb Boulevard north of Wallace Creek. This supply well is screened at various intervals to a depth of approximately 205 feet. If the supply well is not contaminated, proposed deep-monitoring well 6GW39D will be located approximately 560 feet west of Holcomb Boulevard. If the supply well is contaminated with VOCs, the proposed well will be located farther west of Holcomb Boulevard (approximately 1,800 feet). One round of samples will be collected from each

Baker

Ms. Linda Berry
May 13, 1993
Page 4

newly-installed monitoring well and analyzed for VOCs via method 601/602 (Level III data quality).

Baker can begin the pre-design investigation within weeks so that the information will be available when the remedial design is initiated (September 1993). We look forward to discussing this recommendation with LANTDIV, EPA, and the North Carolina DEHNR. Per your request, we have forwarded this letter to EPA and the DEHNR for their review and consideration.

If you have any questions, please do not hesitate to contact me at (412) 269-2016.

Sincerely,

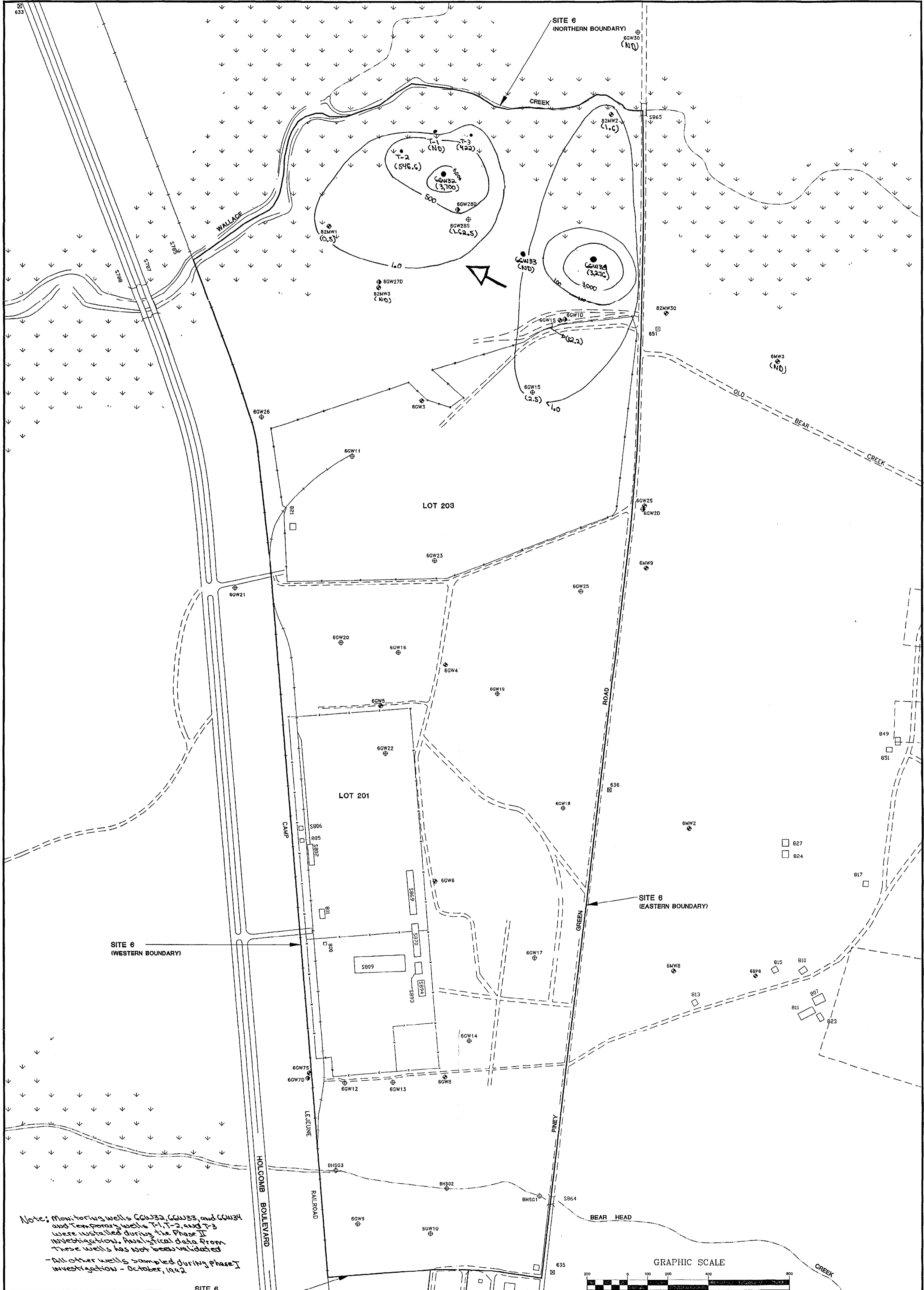
BAKER ENVIRONMENTAL, INC.



Raymond P. Wattras
Project Manager

RPW/nd
Attachments

cc: Mr. Keith Simmons (w/o attachments)
Ms. Lee Ann Rapp (w/o attachments)
Mr. Neal Paul
Ms. Michelle Glenn (EPA Region IV)
Mr. Peter Burger (North Carolina DEHNR)



Note: Monitoring wells 6GW32, 6GW33, and 6GW34 and Temporary wells T-1, T-2, and T-3 were installed during the Phase II investigation. Analytical data from these wells has not been validated.

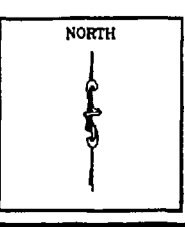
- All other wells sampled during Phase I investigation - October, 1992.

LEGEND

- Estimated Groundwater Flow Direction
- EXISTING SHALLOW MONITORING WELL
- SHALLOW MONITORING WELL INSTALLED BY BAKER ENVIRONMENTAL, Inc., 1992
- DEEP MONITORING WELL INSTALLED BY BAKER ENVIRONMENTAL, Inc., 1992
- STAFF GAUGE INSTALLED BY BAKER ENVIRONMENTAL, Inc., 1992
- NEWLY INSTALLED SHALLOW WELL - Phase II

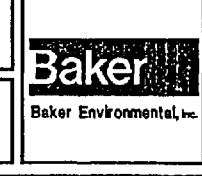
SOURCE: LANTOY, FEBRUARY 1992

DATE: APRIL 1993
SCALE: 1" = 200'
DRAWN: R.E.L.
REVIEWED: RPW
S.O.#: 19133-22-SRN
CADD#: 133502RI



REMEDIAL INVESTIGATION CTO-0133
MARINE CORPS BASE CAMP LEJEUNE
NORTH CAROLINA

BAKER ENVIRONMENTAL, Inc.
Coraopolis, Pennsylvania



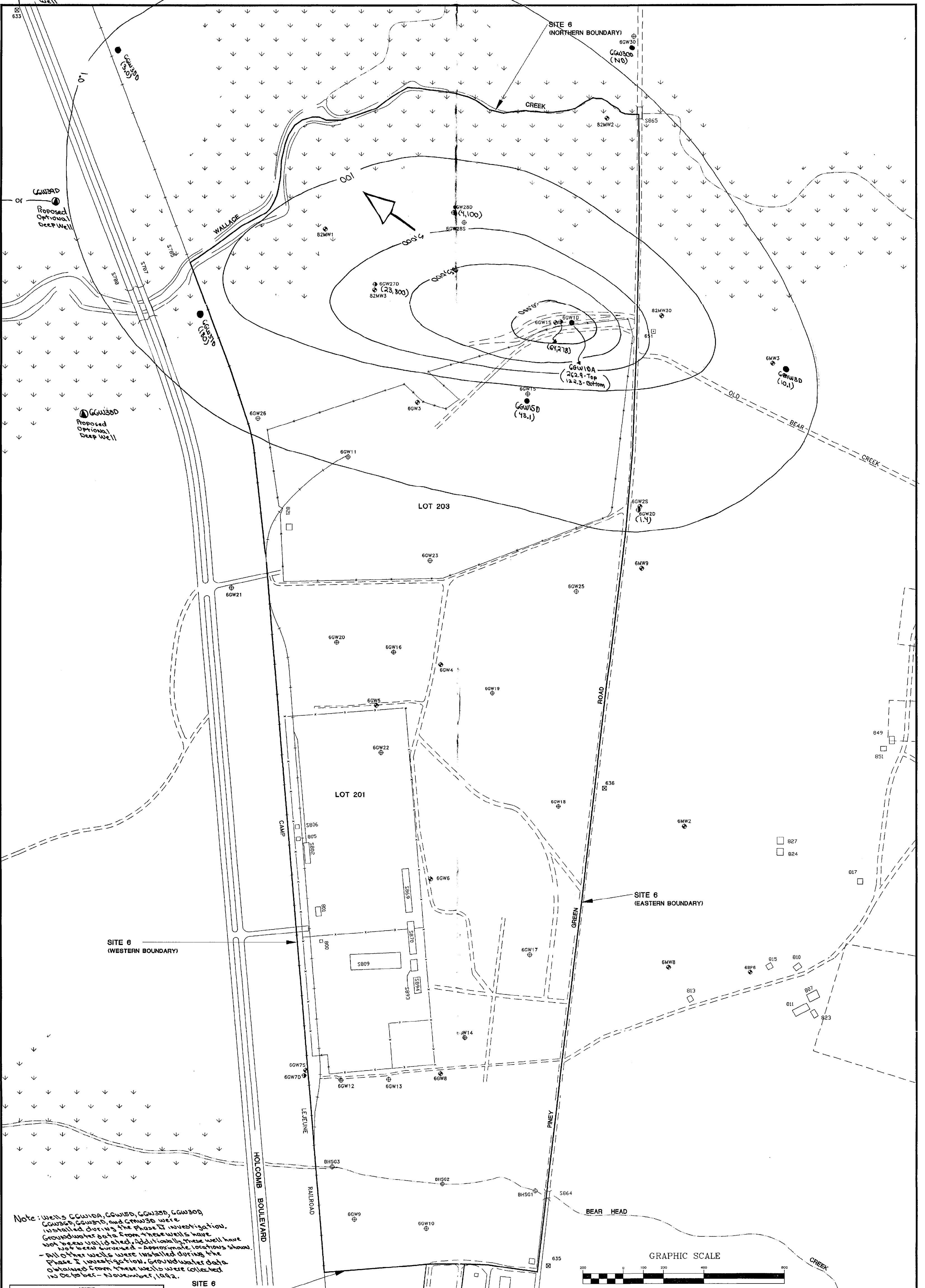
MONITORING WELL AND STAFF
GAUGE LOCATION MAP
FOR SITE 6
Shallow Groundwater - Total VOCs

SCALE: 1" = 200'
DATE: APRIL 1993

FIGURE No.
1

T-1 - Temporary well

1351011X



4100 Total VOCs in 1991

6GW15 EXISTING SHALLOW MONITORING WELL
6GW20 SHALLOW MONITORING WELL INSTALLED BY BAKER ENVIRONMENTAL, Inc., 1992
6GW10 DEEP MONITORING WELL INSTALLED BY BAKER ENVIRONMENTAL, Inc., 1992
BHS61 STAFF GAUGE INSTALLED BY BAKER ENVIRONMENTAL, Inc., 1992

Estimated Groundwater Flow Direction

DATE: APRIL 1993
SCALE: 1" = 200'
DRAWN: R.E.L.
REVIEWED: RPW
S.O.#: 19133-22-SRN
CADD#: 133502RI

REMEDIAL INVESTIGATION CTO-0133
MARINE CORPS BASE CAMP LEJEUNE
NORTH CAROLINA

BAKER ENVIRONMENTAL, Inc.
Coraopolis, Pennsylvania

Baker
Baker Environmental, Inc.

MONITORING WELL AND STAFF GAUGE LOCATION MAP FOR SITE 6
Deep Groundwater - Total VOCs

SCALE: 1" = 200' DATE: APRIL 1993

FIGURE No. 2

S.O. No. 19133-70-SRW

Subject: FIGURE 3

Baker

Sheet No. _____ of _____

Drawing No. _____

Computed by _____ Checked By _____ Date _____

Cross-Sectional View of Contaminant Distribution

